Programme	:	**Diploma in ET**/CE/**EE** /ME/MT/CM/IT/DDGM
Programme Code	:	01/02/**03**/04/05/06/07/08/**17**/21/22/**23**/24/26
Course	:	**Fundamentals of Electrical Engg.**
Course Code	:	**EE 283**

Teaching Scheme:

	Hours/Week	Total Hours
Theory	**03**	**48**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	**Practical**	**Oral**	**Term Work**
Duration	Two Class Tests of 60 Minutes and an Oral	03 Hrs.	--	--	--
Marks	20	80	--	25	25

Course Rationale:

Every branch of engineering is related with electrical engineering. Every student should know Fundamentals of electrical engineering. From this point of view this course is introduced.

Course Objectives:

After studying this course, the student will be able to

- Understand the basic and fundamental principle of Electrical engineering.
- Measure electrical quantity.
- Know the various electrical circuits concepts
- Know principle and construction of various electrical machines
- To explore electrical safety

Course Content:

Chapter No.		Name of Topic/Subtopic	Hrs	Marks
1		**Electrical Circuits**		
	1.1	Introduction to electric power supply system, AC Supply –single phase and three phases, DC supply.	04	08
	1.2	Resistance, Effect of temperature on resistance (pure metals, insulators, alloys), temperature Coefficient of Resistance.		
	1.3	Resistances in series, voltage division formula		
	1.4	Resistances in parallel, current division formula.		
2		**Magnetic Circuit:**		
	2.1	Introduction to magnetic circuit, M.M.F., absolute and relative permeability, reluctance, relation between M.M.F. and reluctance	04	06
	2.2	Comparison of magnetic & electrical circuits.		
	2.3	Simple series magnetic circuits, concept of useful Flux, leakage flux, total flux & fringing.		
	2.4	Magnetization curves.		
	2.5	Concept of hysteresis, hysteresis loop & loss		
3		**Electromagnetic Induction**		
	3.1	Faradays laws of Electromagnetic Induction.	04	06
	3.2	Types of induced e.m.f : Dynamically induced e.m.f and Statically induced e.m.f (self and mutually)		
	3.3	Lenz's law, Fleming's right hand rule.		
	3.4	Self and mutually induced inductance ,Coefficient of coupling		
4		**Electrostatics:**		
	4.1	Brief review of electric field, field density, permittivity, Relative permittivity, charge & their relation.	04	08
	4.2	Capacitor & Capacitance, Dielectric constant, Capacitors in series & parallel		
	4.3	Capacitance of parallel plate capacitor with single Dielectric and composite dielectric medium .		
	4.4	Charging and discharging of capacitor to give idea of R-c time constant (no derivation)		

5		**A.C. Fundamentals:**		
	5.1	Generation of single phase alternating voltage and current, Graphical representations of sinusoidal e.m.f and current. General Equation of Alternating quantity 3	10	16
	5.2	Definitions of instantaneous value, cycle, period, frequency, amplitude. Peak value, average value, r.m.s. value of an alternating quantity, peak factor and form factor		
	5.3	Concept of phase and phase difference. Concept of lagging and leading		
	5.4	Representation of an alternating quantity by phasor.		
	5.5	Waveforms and Phase diagram for a Purely resistive AC circuit Purely inductive AC circuit. Purely capacitive AC circuit. (Voltage, Current, power, p.f. relations and phasor Diagrams,).		
	5.6	RL Series circuit: Waveforms , phasor diagram, Impedance, Impedance triangle, power factor.		
	5.7	RC circuit: Waveforms, phasor diagram, Impedance, Impedance triangle, power factor		
6		**Three Phase Circuits**		
	6.1	Generation of 3-phase voltage and its waveform.	04	08
	6.2	Phase sequence, star & delta connection.		
	6.3	Concept of balanced load. Concept of balanced Supply system.		
	6.4	Voltage, current, power relations in star & delta Connected system & numerical, Vector diagram.		
7		**Single phase Transformer**		
	7.1	Definition, principal of working, construction.	04	06
	7.2	Types of transformer on the basis of voltage, power & Construction.		
	7.3	E.M.F. equation (No derivation).		
	7.4	Voltage, current ratio o f a transformer.		
	7.5	Losses in transformer, efficiency & regulation of Transformer.		
8		**Electrical Motors**		
		A) D.C. Motors	04	08

		8.1 Construction and Working principle of d .c. motor 8.2 Types of motors 8.3 Characteristics & applications of d. c. motors. 8.4 Necessity of a starter for dc Motor.		
		B) Induction Motor 8.1 Construction and working principle of three phase Induction Motor 8.2 Synchronous speed, slip 8.3 Necessity of a starter ,D.O.L starter for three phase Induction motor. 8.4 Change the direction of rotation 8.5 Single Phase Induction Motors- Working principle and applications of following Motors I)Split Phase a)Resistance b)Capacitance II)Capacitor start capacitor run III) Shaded pole. Reversal of rotation of above motors.		
		C) Special Motors 8.1 Working principle and applications-stepper motor servo motor-AC servo motor & DC servo motor		
9		**Electrical Safety**		
	9.1	I.E. rules for safety of person & equipment followed When working with electrical installation. Electrical Hazards : Causes and Remedies	04	06
	9.2	Electrical shock, Operational precautions necessary to avoid electrical shock ,Procedure for rescuing a person who has received an electrical shock.		
	9.3	Necessity of Earthing		
	9.4	Introduction to circuit protective devices: Concept of Overload O.C., S.C., leakage current, H.R.C. fuses, MCB, use of ELCB		
Total			48	80

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Practical/Experiment/Assignment	Hrs.
1	To determine temperature rise of resistance of metal.	04
2	Verification of Right hand rule for solenoid.	02
3	Verification of Faradays laws of Electromagnetic Induction.	02
4	To plot the B-H curve of a magnetic material.	02
5	To plot the charging & discharging curve of a capacitor.	02
6	To verify the relation between line & phase values of Current and voltage in a balanced star & delta connected circuit.	04
7	To determine voltage & current ratio of single-phase transformer and determine efficiency and voltage regulation of single phase transformer	04
8	Reversal of rotation of following motor I)D.C.Motor II)Three phase Induction motor	04
9	Demonstration o f use & tripping of MCB against overload & short circuit.	02
10	Demonstration of use & tripping of ELCB against leakage Current.	02
	Total	**32**

Note: All practicals are Compulsory

Instructional Strategy:

Sr.No.	Topic	Instructional Strategy
1	Electrical Circuits Lecture, Problem solving ,practical	Lecture, Problem solving ,practical
2	Magnetic Circuits	Lecture, Q/A Technique
3	Electromagnetic Induction	Lecture, Problem solving
4	Electrostatics	Lecture, Problem solving ,practical

5	A.C. Fundamentals:	Lecture, Problem solving ,practical, Q/A Technique
6	Three Phase Circuits	Lecture, Problem solving ,practical
7	Single phase Transformer	Lecture, Problem solving ,practical
8	Electrical Motors	Lecture, Problem solving ,practical
9	Electrical Safety	Lecture, Demonstration and PPTs 6

Text books:

Sr. No.	Author	Title	Publication
1	1 B.L.Theraja	Electrical Technology Vol. I & II.	S. Chand & Co.

Reference Books:
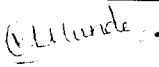
Sr. No.	Author	Title	Publication
1	Edvard Hughes	Electrical Technology	Pearson Education
2	H.Cotton	Electrical Technology	CBC,Delhi
3	V.N.Mittle	Basic Electrical Engineering	Tata McGraw Hill

Specification Table:

Sr.No.	Topic	Cognitive levels			Total
		Knowledge	Comprehension	Application	
1	Electrical Circuits	02	04	02	08
2	Magnetic Circuits	02	04	02	08
3	Electromagnetic Induction	02	04	00	06
4	Electrostatics	04	02	02	08
5	A.C.Fundamentals	08	06	02	16
6	Three Phase Circuits	04	02	02	06
7	Single phase Transformer	02	02	02	06
8	Electrical Motors	06	06	04	16
9	Electrical Safety	02	01	01	04

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